EXHIBIT H

REBUTTAL REPORT

Precision Pipeline, LLC v. Dominion Transmission, Inc.

Prepared for:

McGuire Woods LLP

Prepared by:

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CEC Project 175-554

January 3, 2018

PRIVILEGED AND CONFIDENTIAL
ATTORNEY/CLIENT WORK PRODUCT

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.'S REBUTTAL EXPERT REPORT IN RESPONSE TO GEOTECHNICAL EXPERT REPORT PRECISION PIPELINE, LLC v. DOMINION TRANSMISSION, INC.

Civil & Environmental Consultants, Inc. ("CEC") was retained by McGuireWoods LLP to prepare this rebuttal report in response to the Geotechnical Expert Report, dated December 19, 2017, prepared by Stephen C. Pasternack, P.E., Ph.D. with S&ME, Inc. ("S&ME Report"). This report presents CEC's rebuttal of the S&ME Report and opinion regarding the referenced matter.

GENERAL INFORMATION

The S&ME Report was prepared to support the Precision Pipeline, LLC ("Precision") complaint filed against Dominion Transmission, Inc. ("DTI") disputing money retained by DTI for post-construction landslide repairs that DTI made on the TL-590 pipeline right-of-way ("ROW"). DTI maintains that the landslide repairs should have been completed by Precision under the warranty provisions in the January 7, 2011 Pipeline Construction Contract between Precision and DTI. The Kenrich Group LLC ("KRG") was retained to determine the economic damages DTI incurred due to payment and warranty issues. The KRG report stated that in 2013, over thirty (30) landslides or "slips" occurred on the TL-590 ROW and in 2014 another twenty (20) slips occurred. DTI notified Precision that these slips occurred and that they were to be repaired as warranty work. Precision refused to repair these slips. As a result, DTI, the owner of the ROW, incurred costs associated with repairing the slips in order to comply with state and federal requirements and permit conditions.

The following documents were provided to CEC by McGuireWoods LLP and reviewed by CEC in preparing this rebuttal report:

1. Pipeline Construction Contract between Dominion Transmission, Inc. and Precision Pipeline, Inc., dated January 7, 2011 (the "Contract");

2. Precision Pipeline, LLC letter to Carole McCoy, dated December 13, 2010 and incorporated into the Contract as "Addenda B – 3 Contractor's Exceptions and Alternatives";

3. S&ME Geotechnical Expert Report, dated December 19, 2017;

4. S&ME letter entitled, Site Visit / Geotechnical Discussions – Landslide Evaluations, dated June 4, 2015;

5. The Kenrich Group LLC, Expert Report of Mark Gentry, dated November 17, 2017;

6. Dominion Transmission, Inc., General Specifications for Pipeline Construction, dated May 2009 and incorporated into the Contract as "Exhibit E – 2.1";

7. Email from Mark D. Reaser to Jonell L. Carver entitled, TL-590 Slip Repair History Evaluation, dated July 12, 2016;

8. Erosion and Sedimentation Control Plans prepared by GAI Consultants, Inc., dated October 12, 2010;

9. Deposition of Gregory S. Park, *Precision Pipeline, LLC v. Dominion Transmission, Inc.*, December 7, 2017;

10. Deposition of Brittany Moody, *Precision Pipeline, LLC v. Dominion Transmission, Inc.*, December 5, 2017;

11. Deposition of Carole A. McCoy, *Precision Pipeline, LLC v. Dominion Transmission, Inc.*, November 9, 2017.

The above documents use the terms "slips" and "landslides." In this report, CEC refers to all ground mass movement as landslides.

PRECISION'S QUALIFICATIONS

In the December 13, 2010 letter, Precision stated that, "Precision is uniquely qualified to perform this work in that we have both the expertise, in terms of having a deep field of highly experienced and extremely qualified people…and we have worked successfully in the rugged mountains of the Marcellus area…" The letter also states that Precision accepted the Contract with no exceptions.

On page two of the letter, under the heading of Risk Areas/Mitigation Recommendations (d), Precision states, "For the most part these projects are standard for the region and as such, from a construction prospective, do not warrant discussion here."

APPLICABLE CONTRACT PROVISIONS

The following sections of the Contract were referenced as part of the preparation of this report:

Section 18.1:

> Quality of Services. Contractor warrants and represents that the Work shall: (i) be performed in a good and workmanlike manner in accordance with professional industry standards (with the level of skill, knowledge and judgment required or reasonably expected of providers of comparable services), (ii) meet the terms of

this Contract, and (iii) be free from Defects. This warranty for the quality of the Work shall be effective until two (2) years after the Final Restoration and Project Completion Date. [1]

Section 3.7:

Familiarity with Project Site; Conditions Affecting the Work. Contractor agrees and acknowledges that it is familiar with the Work, the Projects Site(s) (to include having made all necessary visits to the Project Site(s) before executing this Contract), other local conditions that may affect the Work, and shall furnish the supervision, labor, equipment, tools, materials, and supplies required to provide the Work in accordance with the terms of this Contract for the Contract Price.

(a) Contractor acknowledges that it has investigated and satisfied itself as to the conditions affecting the Work, including but not limited to those bearing upon: . . . (vi) the character, quality and quantity of surface and subsurface materials or obstacles to be encountered. Any failure by Contractor to acquaint itself with the available information shall not relieve it from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

Exhibit E – 2.1, Item 1.08:

The method of clearing the right of way shall take into account matters of soil stability, protection of natural vegetation, and the protection of adjacent resources.

Exhibit E – 2.1, Item 1.09:

Efforts shall be made to avoid clearance of the right of way to the mineral soil, except in the ditch itself. Where this does occur in scattered areas of the right of way, the surface shall be restored and stabilized without undue delay.

Exhibit E – 2.1, Item 6.05:

To prevent the backfill from sliding or washing, Contractor shall protect the backfill on sloping ground by providing and installing breakers of earth-filled sacks or foam at the locations designated by the Project Supervisor, and/or as indicated in the Pipeline Data and Maps and Plans.

[1] "Work" is a defined term under the Contract meaning "the design, engineering, construction, materials and equipment, testing, and other services provided by Contractor in accordance with the terms of this Contract, including without limitation, Exhibit A – Scope of Work: Pipeline Data, Exhibit B – Addenda, and all Authorized Special Work, Base – Lay Pipe Work, and all Extra Work." "Defects" is also a defined term under the Contract meaning "with respect to the Work performed hereunder, Work, or any portion thereof, not conforming to this Contract." *See* Article 1.

Exhibit E – 2.1, Item 6.06:

> The backfill shall be kept free of large rocks, brush, logs, stumps, or refuse of a similar nature.

The following sections from DTI's Erosion and Sedimentation Control Plans were referenced as part of the preparation of this report:

Construction Sequence and General Notes – Item 10:

> DURING CONSTRUCTION, INSTALL AND MAINTAIN ANY ADDITIONAL E&S CONTROL BMPS, AND IMPLEMENT STRUCTURAL POST-CONSTRUCTION STORMWATER BMPS (WATERBARS) THAT MAY BE REQUIRED.

Construction Sequence and General Notes – Item 12:

> BACKFILL AREAS EXCAVATED FOR THE INSTALLATION OF THE UTILITIES WITH SUITABLE EXCAVATED MATERIAL. IN AREAS WHERE TOPSOIL HAS BEEN SEGREGATED, THE SUBSOIL WILL BE REPLACED FIRST, AND THE TOPSOIL WILL BE SPREAD OVER THE AREA FROM WHICH IT WAS REMOVED. FINAL GRADES SHALL BE THE SAME AS THE PRE-CONSTRUCTION CONTOURS.

REBUTTAL REVIEW OF S&ME REPORT

CEC offers the following responses to the S&ME Report:

Section 2.3 and 2.3.1

S&ME: Section 2.3 of the S&ME Report states that "landslides in the area of this pipeline are plentiful and occur naturally." This section also states that this area is "located in the largest area with a high susceptibility to landslides in the United States." Section 2.3.1 of the report concludes "it is difficult, if not impossible to route any pipeline in this area without encountering areas susceptible to landslide activity or to natural landslides. Activities such as introduction of water, addition of a surcharge load, or removal of the toe of a natural slope can cause landslide movement to occur."

CEC: CEC agrees that landslides are plentiful in the area of pipeline construction in Greene County, Pennsylvania and Marshall County, West Virginia and that it is difficult, if not impossible to route pipelines through areas that are not susceptible to landsliding. It is not a problem unique to the DTI project. Landslide problems associated with pipeline construction is common knowledge in the industry and any contractor bidding or working on pipeline construction in the Marcellus region would reasonably be expected to be aware of this.

Section 2.3.2

S&ME: The report in Section 2.3.2 asserts that, "Pipeline construction typically requires that loose fill be placed over the pipe and in other areas which have been disturbed in order to restore original grades." This practice, the report states, leads to landslides on steep slopes, as does the practice of placing fill to restore original grades that are too steep for the strength of the fill.

CEC: Exhibit E-2.1, Section 6.05 states, "To prevent the backfill from sliding or washing, Contractor shall protect the backfill on sloping ground by providing and installing breakers of earth-filled sacks or foam at the locations designated…".

Item 12 of the Construction Sequence and General Notes for DTI's Erosion and Sedimentation Control Plans states that the "Backfill area excavated for the installation of the utilities with suitable excavated material."

Section 6.01 states that the pipe shall be padded with rock-free backfill, but it does not require loose fill be placed in other disturbed areas of the ROW. Section 1.08 specifies, "the method of clearing the right of way shall take into account matters of soil stability, protection of natural vegetation, and the protection of adjacent resources." Section 1.09 specifies, "Efforts shall be made to avoid clearance of the right of way to the mineral soil, except in the ditch itself. Where this does occur in scattered areas of the right of way, the surface shall be restored and stabilized without undue delay."

The movement of earth is an integral part of pipeline construction, and it is common that excavations are required beyond the pipe trench for equipment access and other measures. Where steep and/or undulating topography is present, contractors will often excavate sections of stable soils and rock as a convenience for installing the pipeline. An experienced and qualified pipeline contractor should be reasonably expected to perform earthmoving activities that provide stable soils and slopes post-construction. Even if soil cannot be compacted over or around pipes, this does not mean the contractor can disregard proper fill placement methods and place loose fill in other areas on the ROW, thereby increasing the risk of landslides. The owner expects that construction methods selected by the contractor will not result in defects (in this case landslides) in the work.

Section 2.3.3

S&ME: In Section 2.3.3, the report states that the presence of landslides on ROWs has received little regulatory attention.

CEC: The presence of landslides on ROWs is addressed in all erosion and sediment control regulations. The ground movement of a landslide causes unvegetated soil to become exposed. Exposed soil can result in sediment entering streams and wetlands. In CEC's experience, meeting

erosion and sedimentation control permit requirements or regulations is commonly the factor requiring landslide repair.

Regulators were aware of the problems associated with landslides on pipeline ROWs before construction of TL-590. Regulators commonly issue a Notice of Violation (NOV) whenever a landslide impacts a stream or wetland.

S&ME: In Section 2.3.3 the report states that improperly installed erosion and sediment control (ESC) features are seldom the cause for a landslide.

CEC: CEC has observed many landslides caused by improperly installed or maintained ESC features. Uncontrolled water is one of the leading causes of landslides on ROWs in the Marcellus region. Soil on slopes most often fail in the presence of uncontrolled water. Water bars that are installed too flat or contain localized depressions along their length often pond water and saturate the surrounding soils. Water bars installed over improperly backfilled pipe trenches often introduce water into the trench, saturating soils at a low point in the trench. Water bars that do not extended far enough across the ROW or are not properly maintained allow water to discharge back onto the ROW, thereby saturating areas of fill on the ROW.

Failure of the contractor to control surface water on the ROW can also lead to landslides. Streams, swales, old logging roads and other drainage features must be properly restored to carry water across the ROW. Item 12 of the Construction Sequence and General Notes for DTI's Erosion and Sedimentation Control Plans provides that the contractor is responsible for installing and maintaining any additional erosion and sedimentation control features as well as post-construction waterbars. The intent of this requirement is to control surface water on the ROW.

Sections 2.4 and 2.5

S&ME: These sections summarize S&ME's observations of the landslides. The summary details the steepness of the slopes at the landslide locations. The report does mention that five slopes had erosion issues and one landslide was oriented in a different direction than the others. The summary points out that four landslides were located in areas of previous ground movement. The primary focus, however, is on the steepness of the slopes. The summary specifically states that all of the landslides were on slopes of 2H:1V or steeper. No subsurface information or soils information is presented. Furthermore, no information regarding the moisture conditions of the soils or drainage conditions on the ROW are discussed.

CEC: While the steepness of a slope does factor into the cause of some landsides, it is not the only cause. Other factors causing landslides include the presence of organics, uncontrolled ground water, uncontrolled surface water, and improper construction methods. Appendix III of the S&ME Report includes a table of 21 factors that can cause landslides. These factors are not discussed in detail in the report. The presence of uncontrolled surface or ground water is an important factor and contributes to many landslides on ROWs. Appendix III of the S&ME Report lists "Failure of drainage/Damaged waterbar" as a possible cause of 13 of the 28 landslides listed in the summary

table. In the presence of uncontrolled water, landsides have been observed by CEC on slopes as flat as 4H:1V. Fill is frequently placed with slopes up to about 1.5H:1V without landslides forming, provided surface and ground water are properly controlled.

While CEC is not familiar with the landslides mentioned by S&ME that were caused by erosion, the presence of landslides suggests ESC features were not properly installed or maintained, or that Precision did not identify that ESC features were needed to control surface water in these locations.

Section 3.0

S&ME: The S&ME Report states that it is not possible for trained engineers to identify where landslides will occur with 100 percent accuracy during construction but that they are in the best position to predict where they will occur on a steep slope and provide design details in the plans and specifications.

CEC: It is not possible to prevent all landslides by predicting where they will occur, regardless of up-front engineering or design details. It is only possible to reduce the risk of landslides occurring. One way to achieve this is by implementing recognized appropriate construction methods. Construction methods including removing wood chips and organics from the slope, installing subsurface drainage where water is encountered, and preparing the ROW in a manner that minimizes or eliminates the need to place fill on the slope during restoration. These construction methods will reduce the risk of future landslides.

S&ME: The opinion is offered in the S&ME Report that "For the majority of these slides, failure was built into the design, as fill placed in accordance with the plans and specifications was not strong enough to resist downhill sliding on steep slopes."

CEC: Precision is a pipeline contractor. They are in the business of moving earth, are experienced working on steep slopes in the Marcellus area, have knowledgeable employees, and are aware of the proper methods to place fill on a ROW. Precision had an obligation to notify DTI that they were unable to place stable fill that would allow the ROW to be properly stabilized following construction.

S&ME: The S&ME Report then states, "The plans, specifications, and contract documents are silent on the topic of landslides or special provisions necessary for fill placement on steep slopes."

CEC: Precision reportedly worked successfully in the rugged mountains of the Marcellus area previously and therefore would have been aware of these landside issues. Additionally, Precision accepted the Contract, agreeing it acknowledged and was familiar with the area, made site visits, investigated, and satisfied itself as to the conditions affecting the work, including the character, quality and quantity of surface and subsurface materials or obstacles to be encountered. At no time did Precision notify DTI that fill could not be properly placed to construct stable fills.

S&ME: The report states, "The plans, specifications, and terms of the contract did not mention the contractor's responsibility for the repair of slips or landslides, nor address the placement of fill for trenches or grade restoration on overly steep slopes."

CEC: Precision accepted the Contract knowing the means and methods necessary to complete these tasks were not specified in the incorporated documents. At no time did Precision take an exception to the Contract, inform DTI that additional information was needed or, that the work could not be completed properly. Additionally, Precision accepted the terms understanding the construction would occur on steep slopes, and the Contract required restoration of the ROW with stable soil and slopes to pre-existing grades.

S&ME: S&ME states, "It is not reasonable to expect the contractor to anticipate the location of naturally existing landslides or to know that fill placed on steep slopes per design will slide."

CEC: The Contract does not require that Precision locate naturally occurring landslides, although maps of historic landslides and landslide prone soils are publically available. Precision previously worked successfully in the rugged mountains of the Marcellus area and was aware of the landslide risks.

S&ME: The section ends with the summary statement that the landslides do not appear to be due to defective construction.

CEC: S&ME is not in a position to make this conclusion based on the data presented in their report. Landslides result from a number of factors including uncontrolled surface and ground water, improperly placing fill on steep slopes, improperly constructing fills or embankments with steep slopes, and disturbing historic landslides or soils prone to landslides. These causes can be exacerbated by the contractor's method of preparing the ROW for construction, and their methods of restoration. For example, during preparation of the ROW in areas with steep slopes, the amount of existing stable soil and rock can be excessively excavated outside the pipe trench such that more fill than would otherwise be required is needed to restore the ROW back to original contours. Placing fill over organics or mixing wood chips in the fill matrix can cause landslides on slopes.[2] The failure to provide subsurface drainage can result in saturated soils and cause landslides. The improper construction or maintenance of water bars, and failing to install proper surface water diversions can saturate soils and cause landslides. The S&ME Report presents as the primary

[2] Brittany Moody, the project manager for TL-590, testified that "there were several slips that w[ere] a result of a buried layer of chips instead of mixing the subsoils like they [Precision] were supposed to, and also controlling water." Moody Dep. (Dec. 5, 2017) at 327:3-6; *see also* 350:18-21 and 351:8-12 ("A: The slips that I investigated that failed as a result of the layers of chips were definitely failed as a result of the layers of chips. The ground broke at the layer of chips. . . . Q: And with respect to all of the other slides at issue, do you have any other observations related to the cause of those slides? A: Just drainage. Like I said, drainage and chips were the main ones."). Similarly, when asked to describe the landslide at Fish Creek on TL-590, Greg Park, the construction supervisor for TL-590, testified that "the biggest thing that stuck in my mind, at the edge of that crack of the slip there was quite a thick layer of chips left over from the project that was kind of exposed, I guess . . . when it cracked off and it slipped over the hill, you could actually see probably a three or four-foot layer of chips I'm confident was from the project, or I guess the byproduct of the time or the slide." Park Dep. (Dec. 7, 2017) at 348:5-14).

causes of the landslides the presence of steep slopes and loose backfill. No subsurface investigations were performed to support the conclusion that other factors or defects did not cause or contributed to the landslides.

CEC LANDSLIDE INVESTIGATIONS

CEC was retained by DTI in 2016 to investigate landslides on the TL-590 ROW and develop remedial designs and recommendations. The work is ongoing and to date CEC has investigated 13 landslides. The scope of the investigation performed at each site included, at a minimum, a site reconnaissance. CEC's site reconnaissance generally consisted of walking the site and surrounding area, taking photographs, and mapping geotechnical features of interest with a handheld GPS unit. Samples of near surface soils at these 13 landslides were also obtained and submitted for geotechnical laboratory testing, including soil classification testing, standard Proctor compaction testing, and direct shear testing performed on remolded soil samples.

At four landslides, CEC supplemented the investigation with geotechnical test borings. To date, CEC has also performed construction quality assurance on six of the sites. The remaining sites either have not yet been repaired (5 sites) or were repaired without CEC providing construction quality assurance services (2 sites).

Attachment A presents a summary table of the specific landslide locations along TL-590 investigated by CEC. The table also presents observations made during CEC's investigations, and if applicable, construction quality assurance observations related to the probable cause of each landslide.

The data summarized in this table reveals that while some landslides occurred on slopes steeper than 2H:1V, more than half of the landslides investigated by CEC did not. This is contradictory to the S&ME conclusion which states that all of the landslide occurred on slopes 2H:1V or steeper. In addition, the data presented in this table documents that factors other than slope steepness contributed to landslides, including: inadequate or poorly constructed ESC features, uncontrolled surface and subsurface water, and organics in the fill. Based on the investigations performed by CEC and observations during landslide repair construction, fill placed by Precision in some areas contained unsuitable materials (e.g., elevated organics), and fill was not adequately compacted to provide soil stability as required by the Contract.

OPINIONS

Within a reasonable degree of engineering and scientific certainty, and subject to change if further information becomes available, it is my opinion that Precision was aware the project was located in an area with landslide risks and, knowing this, accepted the Contract and did not employ appropriate construction methods to reduce the number of landslides that occurred. As a result, a greater number of landslides occurred on the ROW and Precision's refusal to repair them resulted in DTI incurring the cost of repair. This opinion is supported by the following:

1. Precision stated in their December 13, 2010 letter that they were "uniquely qualified" to perform the work because they had "highly experienced and extremely qualified people" and had previously "worked successfully in the rugged mountains of the Marcellus area." Precision was therefore aware that the project included working on steep slopes and landslide prone soils, and that the work would include implementing measures to prevent or repair landslides.

2. By accepting the Contract, Precision agreed that it was knowledgeable and familiar with the area, made site visits and investigated and satisfied itself as to the conditions affecting the work, including the character, quality and quantity of surface and subsurface materials or obstacles to be encountered.

3. Precision accepted the Contract knowing the means and methods necessary to complete tasks associated with fill placement on steep slopes and landslide repair were not specified in the contract documents and at no time informed DTI that additional information was needed or, that the work could not be completed as designed.

4. The Contract includes provisions that require Precision to use methods to maintain stability of the ROW. Specifically, the Contract states that Precision shall take into account matters of soil stability and shall avoid clearance of the ROW to the mineral soil, except in the ditch itself. Where it occurs, the surface shall be restored and stabilized.

5. With highly experienced and extremely qualified people that had successfully worked in the Marcellus area, Precision was aware that landslides would occur and that they would need to be repaired. Precision also knew that landslides occurring after construction would not be acceptable to regulators or DTI and as such the work would not be considered completed free of defects.

6. As a pipeline contractor, Precision was in the business of moving earth, which includes the placement of fill. With highly experienced and extremely qualified people that had successfully worked in the Marcellus area, Precision was aware of proper earthwork methods, including fill placement methods that would reduce the risk of landslides.

7. Knowing that there was a risk of landslides developing, Precision failed to employ earthwork methods in accordance with industry standards. Investigations performed by CEC indicate that landslides occurred due to failure to install subsurface drains in high-risk or seepage areas, failure to provide adequate surface water controls, failure to remove wood chips and other organic debris from fill slope areas, failure to properly construct ESC features, and failure to adequately compact fill.

DISCLAIMER

The services provided were performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions at the same time and similar locality. No warranty, express or implied, is made or intended by rendition of these services or by furnishing oral or written reports of the findings made. CEC reserves the right to revise or amend any opinion in this report in the event new information, documentation, or evidence becomes available.

Enclosure

175-554-Rebuttal to Precision's Opposing Report

ATTACHMENT A

CEC TL-590 LANDSLIDE SITE ASSESSMENTS

CEC Project Name	TL-590 Station	Investigation Types	Average Slope Ratio	Reconnaissance/Investigation Observations	CQA Observations	Opinion of Probable Landslide Cause
Shephards Ridge	341+00	Site Reconnaissance, Lab Testing	1.9H:1V	This slide is located along the edge of the landowner's access road. The slide is very small. No apparent seeps.	Repair Not Performed Yet	Surface runoff and precipitation combined with weak soil.
Grave Creek 1	586+50	Site Reconnaissance	1.3H:1V	A V-Shaped waterbar is intact above slide and appears to be functioning properly. A dry field drain from a recent repair was observed near the base of main landslide. Groundwater seep present above the small slough in the extra workspace on the north side of the ROW.	CEC not retained to provide CQA	Steep slope with inadequate strength backfill compared to the original residual soil/bedrock.
Hall Farm	594+50	Site Reconnaissance, Lab Testing	4.5H:1V	There are no waterbars or notable surface drainage features. Ground surface is heavily indented from the active grazing of cattle. The indentations pool water on the slope. Surface soils are CH.	A thin weak clay seam was observed during landslide excavation.	Poor surface and subsurface drainage through the area in conjunction with a weak soil.
Grave Creek 3	610+50	Site Reconnaissance	2.5H:1V	The pipeline alignment is parallel with the contours and therefore no waterbars are present. No apparent seeps.	CEC not retained to provide CQA	Insufficient data

CEC Project Name	TL-590 Station	Investigation Types	Average Slope Ratio	Reconnaissance/Investigation Observations	CQA Observations	Opinion of Probable Landslide Cause
Aleppo Road	1142+00	Site Reconnaissance, Lab Testing	1.9H:1V	A waterbar conveying water across the slope from both the Texas Eastern and Dominion ROWs terminates in the landslide headscarp area. The next waterbar upslope, which also collects water from the two ROWs drains back onto the ROW and ultimately down to the headscarp area. The wooded area adjacent to the ROW shows signs of past landslide activity. A distinct difference in the moisture content and free water within the restoration soils placed on the ROW after pipeline installation and the underlying virgin soils was noted.	Repair Not Performed Yet	Slide located near base of steeper portion of a bi-linear slope (~1.8H:1V transitioning to ~2.7H:1V). Contribution of water from the two waterbars immediately above the landslide area reduced strength of slope.
Bristoria South	1231+50	Site Reconnaissance, Lab Testing	1.8H:1V	Headscarp of the landslide is below a waterbar conveying water from both Dominion and Texas Eastern's ROW. A distinct difference in the moisture content and free water within the fill placed on the ROW after pipeline installation and the underlying virgin soils. Seepage observed to be entering the landslide headscarp.	Repair Not Performed Yet	Seepage into the landslide area along the fill/natural soils interface and also seepage from the waterbar above the landslide. The slide mass likely consists of fill soils placed over the travel lane constructed to build the pipeline.
Bristoria North	1260+50	Site Reconnaissance, Test Borings, Lab Testing	2H:1V	The landslide is almost completely off the ROW. A large waterbar above the landslide contributes water to an old logging road off ROW. The drainage of the logging road feeds the landslide area as evidenced by a drainage gully observed above the headscarp. A heavy spring was observed at the base of the landslide headscarp.	Repair Not Performed Yet	The slide at the base of steeper portion of a bi-linear slope (~2.2H:1V transitioning to ~3.8H:1V). The heavy spring saturated this area and reduced slope strength. Surface water drainage patterns likely exacerbated the situation.

CEC Project Name	TL-590 Station	Investigation Types	Average Slope Ratio	Reconnaissance/Investigation Observations	CQA Observations	Opinion of Probable Landslide Cause
Access Road 9	1786+00	Site Reconnaissance, Test Borings, Lab Testing	1.7H:1V	There is an intact waterbar upslope of the landslide. During the site reconnaissance the landslide had yet to break from the surrounding ground. CEC did not observe any obvious groundwater seeps in or near the landslide. The geotechnical investigation revealed that within the landslide mass itself relatively soft to loose backfill had been placed.	Unsuitable high moisture content soils containing wood, organics, and buried silt fence were encountered in previously placed backfill.	Backfill with soft, wet soil, and organics/refuse. Insufficient drainage.
Rush Run Rd.	1806+50	Site Reconnaissance, Lab Testing	2.8H:1V	Ground surface, especially immediately above the landslide headscarp, is heavily indented from the active grazing of the area by cattle. The indentations pool water on the slope. The landslide appears to be very shallow ~5-6' max depth	Repair Not Performed Yet	Poor surface and subsurface drainage through the area in conjunction with a weak soil.
School House Road 1	1908+00	Site Reconnaissance, Lab Testing	3.2H:1V	Spring in uncleared portion of the ROW on its south side drains across the ROW towards the stream on the north side and through the landslide. Additional seepage from above drains to the landslide. Seepage from the direction of the pipeline trench, including rust staining, was observed emanating from the landslide head scarp. So much water is flowing on the surface and through the subsurface towards the landslide area that cattails and other wetland species have established themselves within the ROW.	A thin weak clay seam was observed during landslide excavation. Buried organics were observed throughout portions of the landslide mass.	Surface and subsurface seepage saturated the weak organic soils within the landslide mass to the point of failure. Water trapped in the pipeline trench by the foam trench plugs bled out laterally into the landslide area.

CEC Project Name	TL-590 Station	Investigation Types	Average Slope Ratio	Reconnaissance/Investigation Observations	CQA Observations	Opinion of Probable Landslide Cause
School House Road 2	1902+00	Site Reconnaissance, Lab Testing	2.5H:1V	A seep on Texas Eastern's ROW was collected via a waterbar and directed towards the headscarp of the landslide area. Wetland vegetation in the waterbar suggests that it does not completely drain. The exposed soil in the headscarp and at its base had a relatively high moisture content.	Approximately 4 ft.-thick layer of soil with high concentration of buried organics was discovered at slide.	Water pooled in the waterbar above the slide where it infiltrated the slope and led to slide of soil with organics.
Country Lane Landslide	2071+50	Site Reconnaissance, Test Borings/Inclinometers, Lab Testing	2.6H:1V	Pipe alignment parallel with the contours and subsequently no waterbars. A natural ditch is present adjacent to the right flank of the landslide. Soil conditions visible in the headscarp indicate fill placed over the original ground surface. Inclinometers revealed a movement depth between 5 and 7 feet below the existing ground surface in the existing lean clay and fat clay soils.	A thin weak clay seam was observed during landslide excavation and remediation.	Ground modifications including fill placement and modified drainage patterns/volumes activated the landslide along the weak clay seam.
Braden Run Landslide	2200+00	Site Reconnaissance, Test Borings, Lab Testing	1.8H:1V	Slide located above headwaters of a stream. The slide is at a low point in the pipeline trench which collects water saturating surrounding soil. Water was observed seeping from the hillside in during the test boring investigation and saturated soil was encountered in the test boring samples near the ground surface at the slope toe.	Temporary excavations made during construction were stable suggesting the landslide was mostly within the fill placed to restore the natural contours.	Uncontrolled surface and subsurface water saturated fill placed during pipeline construction.